1. Are the following statements true? If not, explain why not.
   a. $\frac{3a}{3a+h} = \frac{a}{a+h}$
   b. $\frac{1}{x+y} = \frac{1}{x} + \frac{1}{y}$
   c. $\frac{x+y}{2} = \frac{x}{2} + \frac{y}{2}$
   d. $5\left(\frac{x}{y}\right) = \frac{5x}{5y}$
   e. $5\left(\frac{a+b}{c}\right) = \frac{5a+b}{c}$

2. Simplify
   a. $\frac{\frac{x}{2}}{\frac{y}{4}} =$
   b. $h \div \frac{x+h}{h} =$
   c. $\frac{\sqrt{x-2} + \frac{5}{\sqrt{x-2}}}{x-2}$

3. Solve for y': $xy' + y = 1 + y'$

4. Find the average rate of change on the indicated intervals:
   a. $f(x) = x^3 - 2x \;; [0, 4]$
   b. $f(x) = 3\sqrt{x} \;; [4, 25]$

5. A car travels 360 miles in a period of 180 minutes. Find the average velocity of the car in miles per hour over this time period.

6. In 1984, the Fizzy Cola Co. sold 23 million gallons of soda. By 2003, the company was selling 127 million gallons of soda. What is the average rate of change in number of gallons of soda per year?

7. Solve for x.

   a. $4x^2 - 21x = 18$
   b. $2x^2 - 3x + 3 = 0$
   c. $x^4 - 9x + 8 = 0$

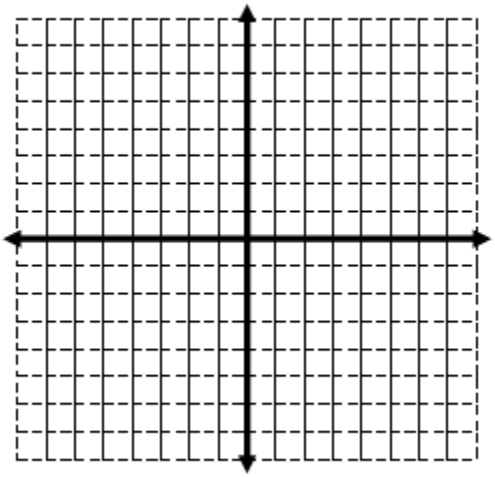
8. Write as a single fraction with the denominator in factor form:

   $\frac{7x^2 + 5x}{x^2 + 1} - \frac{5x}{x^2 - 6} =$

9. Graph the function and answer the questions:

   $f(x) = x^3 - x$

   a. Is the point (3, 2) on the graph?
   b. Is the point (2, 6) on the graph?
   c. Is the function even, odd or neither?
   d. What is the y-intercept?
   e. Find the x-intercepts.



10. Determine if the function is *even, odd, or neither.*

    a. $f(x) = 2x^2 - 7$
    b. $f(x) = -4x^3 - 2x$
    c. $f(x) = 4x^2 - 4x + 4$

11. Find the equation of the line that passes through the point (2, 4) and is:

    a. Parallel to $2x - 3y - 8 = 0$

    b. Perpendicular to $2x - 3y - 8 = 0$

12. Given $f(x) = |x - 3| - 5$ find $f(1) - f(5)$

13. Given $f(x)=x^2-3x+4$ find $f(x+2)-f(2)$

14. Find the domain for each function.

a. $f(x)=\dfrac{1}{4x^2-21x-18}$

b. $g(x)=\sqrt{x^2-5x-14}$

c. $h(x)=\dfrac{\sqrt[3]{x-6}}{\sqrt{x^2-x-30}}$

d. $k(x)=\ln(2x-12)$

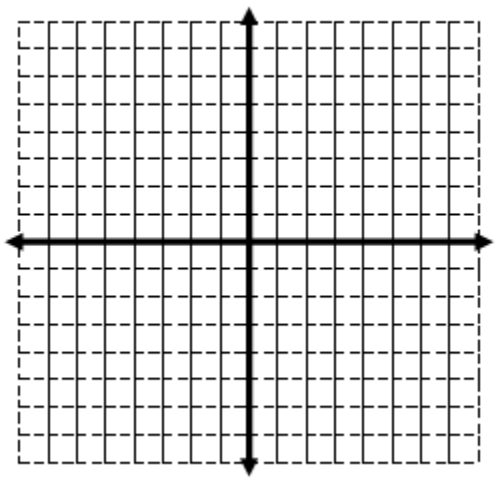
15. Find $f(x+\triangle x)$ for $f(x)=x^2-2x-3$

16. Find $\dfrac{f(x+\triangle x)-f(x)}{\Delta x}$ if $f(x)=8x^2+1$

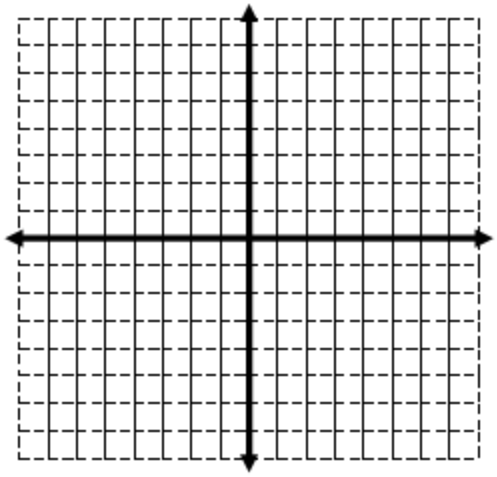
17. Given $f(x)=\dfrac{1}{x}$, Find $\dfrac{f(x+h)-f(x)}{h}$

18. Sketch the graph of each function.

$$f(x)=\begin{cases}1, & x\le 0\\ -1, & x>0\end{cases}$$



$$f(x)=\begin{cases}2x, & -\infty,-1\\ 2x^2, & -1,2\\ -x+3, & 2,\infty\end{cases}$$



19. Given $f(x)=x-3$ and $g(x)=\sqrt{x}$, find the following:
    a. $f(g(x))$
    b. $g(f(x))$
    c. $f(f(x))$

20. Given $f(x)=\dfrac{1}{x-5}$ and $g(x)=x^2-5$, find the following:
    a. $f(g(7))$
    b. $g(f(v))$
    c. $g(g(x))$

21. Let $f(x)=2x-2$, find $f^{-1}x$

22. Simplify using only positive exponents. Do not rationalize the denominator.
    a. $\dfrac{\sqrt{4x-16}}{\sqrt[4]{(x-4)^3}}$

    b. $\left(\dfrac{1}{x^{-2}}+\dfrac{4}{x^{-1}y^{-1}}+\dfrac{1}{y^{-2}}\right)^{-\frac{1}{2}}$

23. If $f(x) = x^2 - 1$, describe in words what the following would do to the graph of $f(x)$.

a. $f(x) - 4$ b. $f(x-4)$ c. $-f(x+2)$

d. $5f(x) + 3$ e. $f(-x)$ f. $|f(x)|$

24. Expand the logarithms.

a. $\ln\left[x^2(y-2)^3\right]$

b. $\ln\left[\dfrac{ex^3}{y^2 z}\right]$

c. $\ln\left[\dfrac{4(x-2)^2}{3\sqrt[3]{y+2}}\right]$

25. Condense into one logarithm.

a. $\ln x + 3\ln y - \dfrac{1}{2}\ln z$

b. $2[\ln(x-1) - 3\ln y] - 4\ln z$

c. $\dfrac{1}{3}\ln x - 2\ln(x+2) + 4\ln(y+2)$

26. Divide using long division: $\dfrac{2x^4 + 5x^3 - 11x^2 + 14x - 5}{2x - 1}$

27. Finish factoring.

a. $2\sqrt{x}+6x^{\frac{3}{2}}=2\sqrt{x}$???

b. $\sqrt{x^2+1}-\dfrac{x^2}{\sqrt{x^2+1}}=\dfrac{1}{\sqrt{x^2+1}}$???

c. $2x+1^{\frac{3}{2}}x^{\frac{1}{2}}+2x+1^{\frac{5}{2}}x^{-\frac{1}{2}}=2x+1^{\frac{3}{2}}x^{-\frac{1}{2}}$???

28. A 7 foot ladder, leaning against a wall, touches the wall x feet above the ground. Write an expression in terms of x, for the distance from the foot of the ladder to the base of the wall.

29. Evaluate without a calculator (all angles are in radians):

a. $\cos 0$ b. $\sin 0$ c. $\tan\dfrac{\pi}{2}$ d. $\cos\dfrac{\pi}{4}$

e. $\sin\dfrac{\pi}{2}$ f. $\sin\pi$ g. $\arccos\dfrac{\sqrt{3}}{2}$ h. $\arctan 1$

i. $\sec\arctan 2$ j. $\arctan -1$ k. $\cos\pi$ l. $\csc\dfrac{\pi}{6}$

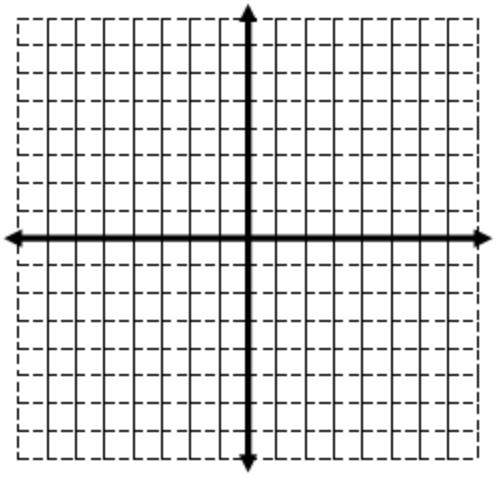
30. Find the solution of the equations for $[0,2\pi]$

a. $2\sin^2\theta=1-\sin\theta$

b. $\sin 2\theta+\sin\theta=0$

c. $2\tan\theta-\sec^2\theta=0$

31. Graph $y = \sin x$ for $-2\pi \le x < 2\pi$



32. If $\tan\theta = \frac{5}{2}$, and $\pi < \theta < \frac{3\pi}{2}$, Find

a. $\csc\theta$

b. $\sec\theta$

c. $\cot\theta$

33. Solve for θ, $0 \le \pi < 2\pi$

$2 + \cos^2\theta = 3\sin^2\theta$

34. If $x = 2\cos^2\theta$ and $y = \sin 2\theta$, show that $(x-1)^2 + y^2 = 1$

35. Evaluate. Let $x_1 = 6$ $x_2 = 8$ $x_3 = 9$ and $x_4 = 13$

a. $m = \frac{\sum_{i=1}^{4} x_i}{4}$

b. $\frac{\sum_{i=1}^{4} x_i - m^2}{4}$

36.

A. Solve and round to the nearest thousandth.

1. $4^x = 3$
2. $\ln x = 1.09$

B. Express y in terms of x:

1. $\log y = x + 2$
2. $\ln y = 2\ln x$
3. $\ln y = 4\ln x + 3$

37. Find the limits.

a. $\lim_{x\to -2} \dfrac{3x^2 + 21x + 30}{x^3 + 8}$

b. $\lim_{x\to 4} \dfrac{\sqrt{x-3} - 1}{x - 4}$

c. $\lim_{x\to 0} \dfrac{\dfrac{1}{x+1} - 1}{x}$